

LODGING ENTERTAINMENT SYSTEM WITH GUEST-SELECTED TIME  
SHIFTING

CROSS-REFERENCE TO RELATED APPLICATION(S)

None.

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BACKGROUND OF THE INVENTION

The present invention relates to entertainment systems for use in the lodging industry. In particular, the present invention is an entertainment system which permits a guest to select television programs to be recorded and to view previously-recorded television programs at a later time in the guest room.

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The past two decades have seen the wide scale introduction of entertainment systems in hotels and other lodging facilities which provide a variety of services to the guest through the guest room television. The range of services typically include regular off-air television programs, pay-per-view movies, Internet access, and guest services such as video shopping and video checkout.

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Lodging entertainment systems typically include a head end which is located within the lodging facility and which is linked to guest terminals in the individual guest rooms by an MATV cable distribution system. The distribution system provides transmission of both audio/video RF signals, as well as two way data and digital communication (typically RF) signals between the head end and guest terminals.

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Typically, lodging entertainment systems are not owned by the hotel, but rather are provided by a vendor who provides the head end equipment, and the guest terminal (including the television, remote control, game controller, keyboard, and associated control circuitry which interfaces the television to the distribution system).

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The entertainment system vendor owns the equipment and pays for the installation of the system in the lodging facility. The vendor must also provide the content, such as movies, games, and cable/satellite programming. The vendor receives compensation based upon amounts the hotel collects from the guest for pay-per-view movies, games, Internet access, and other services for which charges

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are made. The hotel usually receives a percentage of the guest charges, and the sources of content, such as motion picture studios and game program vendors, receive royalties for movies and games which are viewed and played by guest.

In many cases, a guest may not purchase any of the services being offered through the entertainment system. The amount of purchases depend upon the popularity of the movies and other products/services being offered, vacancy rates at the hotel, the demographics of the guests, and the extent of free offerings available through the entertainment system.

There is a continuing need for new and improved offerings which will result in higher purchase rates through the lodging entertainment system. At the same time, any additional products/services which also require significant increases in capital investment in the entertainment systems are difficult to justify. For example, if a new service will require additional capital equipment to be installed in every guest room, or will require the addition of expensive hardware or software at the head end, the total cost of the additional hardware and software must be weighed against the increase in purchases which can be expected from the additional capital investment.

#### BRIEF SUMMARY OF THE INVENTION

The entertainment system of the present invention uses a digital content server and associated mass storage to provide program content, on request, to guest terminals located in guest rooms. Program content includes movies and time shifted program content.

The present invention permits time shifted recording and viewing which is controlled by the guest through the guest terminal. The guest may select an interactive program guide to be displayed on the guest terminal. From the program guide, the guest may select a program which will be broadcast during the guest's stay at the hotel. Upon selection of a program for recording, the host computer will coordinate the operation of an encoding array which can be scheduled to record any channel from the cable or satellite distribution of

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## BRIEF DESCRIPTION OF THE DRAWINGS

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Figure 2 shows a main menu screen.

Figure 3 shows an interactive program guide screen.

## DETAILED DESCRIPTION

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Distribution system 14 is preferably an MATV cable distribution system conventionally used in hotels and other lodging facilities. Distribution system 14 permits the transmission of both audio/video RF signals, as well as two-way data and digital communication (typically RF) signals between headend 12 and guest terminals 16.

Headend 12 includes UNIX host computer 20 (UHC), Internet server and network interface 22, dual ported modem 24, game platform 26, Internet ports 28, interactive ports 30, multi-media ports 32, digital content server (DCS) 34, video switch 36, a bank of selectable modulators 38, encoder array 40, combiner/duplexer 42, telecom modems 44, property management system (PMS) 46, printer 48, and video display terminal (VDT) 50.

UNIX host computer (UHC) 20 is, in a preferred embodiment, a Pentium II or Pentium III computer which runs UNIX operating code, together with software for coordinating the operations of components of headend 12. UHC 20 houses several different computer cards and components. In the embodiment shown in FIG. 1, UHC includes an intelligent communications processor (ICP) card, a multi-port serial card, a number of interactive video port cards, an SCSI interface card, and an ethernet card. In addition, UNIX host computer 20 also houses storage devices such as floppy disk drive, a backup drive, a CD ROM drive, and a hard disk drive.

UHC 20 manages the operation of several other devices of headend 12, together with communication tasks. UHC 20 communicates with dual port modem (DPM) 24, encoder array 40, modem 44, property management system 46, printer 48, and video display terminal 50 over serial lines such as RS-232 lines connected to serial card of UHC 20.

UHC 20 is in charge of polling all of the guest terminals 16 for keystroke activity. The polling function is performed by ICP through DPM 24. ICP communicates with DPM 24 over a high speed serial line. The results of the polling are received back over distribution system 14 and are routed through

UHC 20 communicates with game platform 26 by a high speed serial line between the SCSI port of UHC 20 and game platform 26. For example; game programs stored by UHC 20 are downloaded to the individual game engines of game platform 26 based upon game ordering and selection made by the guest through guest terminals 16.

22, Internet ports 28  
server 34. Internet s  
12 and Internet 60.

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Game platform 26 receives information from UHC 20 from the SCSI card. Keystrokes which are received back from the guest terminal 16 are received by DPM 24 and routed to the appropriate game engine of game platform 26 which corresponds to the guest who has sent the keystroke.

Interactive ports 30 provide audio and video associated with menuing, program guides and other interactive services. These include guest services such as video checkout, interactive shopping, surveys, opinion polls, and room service ordering.

Digital content server 34 includes digital storage (e.g. a RAID hard disc array) with storage capacity to store all desired program content to be offered to the guest. This includes, for example, movies, music, web cinema, pre-recorded broadcast programs from a central site, and guest-selected programs recorded for time-shifted viewing. The content is stored in files in the digital storage, and each type of service has its own directory where its content is stored. The overall storage space is shared among the various services. The content is stored in an encoded format such as MPEG-2.

Video switch 36 is a device that receives baseband audio and video signals at its input ports, and routes those signals to output ports which are connected through individual lines to inputs of individual modulators 38. Video switch 36 is capable of connecting any one of the baseband audio/video signals received at its inputs to any one more of the bank of modulators 38. Although one video switch is shown in FIG. 1, multiple video switches can be used as needed.

Operation of video switch 36 is under control of UHC 20, which tells video switch 36 which input port connect to which output port.

Modulators 38 convert baseband video and audio signals received at their inputs to RF and deliver the signals to combiner/diplexer 42. Each  
5 modulator is set to modulate on a specific frequency or RF channel. The outputs of modulators 38 are connected to inputs of combiner 42.

As shown in FIG. 1, cable/satellite receiver 18 receives cable or satellite programming, which is supplied to combiner/diplexer 42. Receiver 18 provides the programming (which is the free-to-guest television programs) on  
10 channels which are different from the channels produced by modulators 38. In that way, there is no channel overlap between the free-to-guest television programming and the other offerings (such as pay-per-view movies or games).

Encoder array 40 is a computer with a group of tuner/encoder cards which can be scheduled to record any channel of the cable/satellite programming  
15 from receiver 18. Multiple encoder cards allow different channels to be encoded at the same time. Encoder array 40 receives instructions as to the channel and time of encoding from UHC 20. Once the program has been encoded to a file (such as an MPEG-2 file), the data is moved to digital content server 34 via an ethernet or SCSI connection. Once the file is stored in digital content server 34, a guest can  
20 choose to playback the file (i.e. the recorded program). File names are unique, and preferably identify the guest and the program recorded so that multiple guests can have files stored in digital content server 34, and a guest can have multiple files. Recorded files can be deleted when the guest who requested recorded of that program checks out, or at a predetermined time after recording. Control of deleting  
25 files is by UHC 20.

UHC 20 communicates with the owner/operator of entertainment system 10 through modem 44. The system owner and operator is typically remote from the hotel facility, and must receive usage, billing, and financial information

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Property management system (PMS) 46 is a computer system operated by the hotel to track charges incurred by individual guests. These charges typically include room charges, as well as dining charges, room service, telephone charges, charges for use of hotel entertainment system 10, and a variety of other charges. As charges related to system 10 are incurred, UHC 20 communicates that information to PMS 46. During video checkout operations, UHC 20 communicates with PMS 46 to obtain the data necessary to show the guest, on guest terminal 16, a folio of charges associated with that guest's room. The video checkout system allows the guest to approve the charges and to authorize payment for those charges through a credit card number previously given to the hotel and stored in property management system 46.

The control card of guest terminal 16 receives keystrokes from remote control 72, game controller 74, and keyboard 76. In the case of remote control 72, the keystrokes are in the form of infrared signals which are transmitted from an infrared transmitter within remote control 72 to an infrared receiver associated with television 70. The keystrokes are passed by the control card to distribution system 14 back to headend 12. The guest selects options by viewing interactive menus on the screen of television 70 and pressing keys of remote control 72 accordingly. These key presses are received and stored by the control card. In response to polling signals from headend 12, the control card provides system data representing the keystrokes to headend 12 which indicates which key or keys have been pressed.



Video game controller (or game paddle) 74 is connected by a cable to television 70. Alternatively, game paddle 74 can be connected via an IR link. Keystrokes from game paddle 74 are supplied to the control card, and then are supplied as part of system data in response to polling of guest terminals 16 by headend 12. In some embodiments, game paddle 74 includes keys which duplicate keys on remote control 72 so that game paddle 74 can be used to initiate interactive sessions and order programs without the need to use remote control 72.

Keyboard 76 is connected to television 70 either through a cable or by an IR link. Keystrokes from keyboard 76 are supplied by the control card of guest terminal 16 to headend 12 in response to polling. Keyboard 76 is useful for interactive services such as Internet, e-mail and computer games. Keyboard 76 can, in some cases, be used to initiate interactive sessions, order programs or select programs to be recorded, rather than using remote control 72.

When a guest wishes to use entertainment system 10, the guest presses a key on remote control 72 to turn on television 70. A welcome screen will first appear on the TV screen of guest terminal 16. If the guest wishes to view off-air or satellite programming which is free programming, those channels are accessible by pressing the channel up or channel down keys on remote control 72. If, on the other hand, the guest wishes to view and perhaps select other offerings of system 10, such as on demand movies, Internet access, interactive video games, recording of broadcast programs for time-shifted viewing, or interactive services, the welcome channel screen provides an instruction to the user to select a menu. Upon pressing the menu key, a signal is provided to the control card 50, which stores the keystroke information until the next time that guest terminal 16 is polled by headend 12. In response to polling, the keystroke indicating pressing of the menu key is supplied to headend 12. This results in UHC 20 selecting one of the interactive ports (which are either internal to UHC 20 or are part of interactive ports 30) to display a series of interactive menus which are navigated by the guest through the use of keystrokes supplied by remote control 72 (or alternatively game

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time-shifting services, a selection of a previously recorded program from the interactive program guide may result in a charge being made to the guest's account. The determination of whether a charge is to be made is done by UHC 20. To avoid disputed charges, the selection from the interactive program guide of a previously recorded program may be followed by a follow-on screen requesting that the guest verify the selection and order of the time-shifted program (with the associated charge to be made), before the program is played back by digital content server 34 and delivered to that particular guest television 70.

In one embodiment of the invention, the use of the time-shifting feature by the guest is achieved as follows. When the guest first turns on the television, a welcome channel appears. The welcome channel screen may identify the "hotel" as well as the entertainment service provider. The general description of available services is included. If the guest presses the channel up or down buttons, the television will be tuned to one of the free-to-guest channels. On the other hand, if the guest presses the menu button on the remote control 72, the headend will produce first an interstitial screen indicating that the system is "accessing" and then will display a main menu screen.

The main menu screen includes listings of various services available for selection by the guest. Figure 2 shows an example of main menu screen 100, which lists ten different selectable services: "movies", "Internet", "games", "what's cool", "hotel services", "special offer", "premium T.V.", "help", "interactive T.V. listings", "got your laptop?" The guest uses the navigational arrow buttons on remote control 72 to highlight one of the available services, or uses the key number or symbol associated with the services. For example, key "3" can be pressed to highlight games, while key "\*" can be pressed to highlight "interactive T.V. listings" (which will lead to the interactive program guide). To access the highlighted service, the guest must then press the select button on the remote control 72.

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the guest, UHC 20 causes the tuner of guest terminal 16 to tune the television to the requested free-to-guest channel.

Second, the guest may use interactive program guide 200 to select a pay-per-view movie. If a movie in field 230 is highlighted and selected, UHC 20 will display a "description and order" screen for the selected movie. This screen includes a description of the movie, an indication of the price for ordering the movie, and includes "go back" and "order" selections". If the guest presses "go back", this indicates that the guest is not interested in ordering the movie, and interactive program guide 200 is again displayed on the guest terminal screen. If the guest selects "order", a "thank you" screen is displayed, and then the ordered movie begins to play. UHC 20 provides the necessary control inputs to digital content server 34 locate the digital file containing the ordered movie and to initiate its play back. In addition, UHC 20 selects an available modulator from the bank of modulators 38 and configures video switch 36 to connect the output port of digital content server 34 at which the ordered movie is being supplied to the selected modulator. Through control signals to the guest terminal 16, UHC 20 causes the guest terminal 16 to be tuned to the particular channel on which the movie is playing. UHC 20 also determines the appropriate charge to be made to the guest's account, and provides that information to PMS 46.

A movie purchase through interactive program guide 200 is an alternative to the selection of a movie by selecting "movies" from the main menu screen 100 shown in Figure 2. Interactive program guide 200 provides an alternative path for reaching the "description and order" screen from which the pay-per-view movie is ordered.

Third, the guest may use interactive program guide 200 to select and order a previously recorded program for time-shifted viewing. The guest highlights the program of interest from field 240 or field 250 and presses "select". What happens next will depend upon the particular way in which the guest is to be charged for the time-shifted programming feature. If a charge will be made for

each time-shifted program that is viewed, then UHC 20 will display an "order" screen in response to the selection of a previously recorded program. The order screen will indicate the price for viewing the time-shifted program, and will include "go back" and "order" options. If the guest selects "go back", interactive program  
5 guide 200 will again appear on screen. If the guest selects "order", a "thank you" screen will appear, followed by the play back of the previously recorded program. UHC 20 will control the digital content server 34, video switch 36, and guest terminal 16 in a manner which is similar to the process for viewing a movie. The digital file stored in digital content server 34 containing the previously recorded  
10 program will be accessed, decoded and played back. The output of digital content server 34 will be connected through video switch 36 to an appropriate modulator 38, and the appropriate guest terminal 16 will be tuned to the appropriate channel to allow the guest to watch the program as it is played back.

If the guest is charged for recording a program but is not charged  
15 again for playing that program back, then the display of the order screen may not be necessary - - if the program being viewed is one which the guest caused to be recorded. Since the guest's identification is associated with the recorded program, UHC 20 can check to see whether the guest is selecting one of the programs that the guest recorded, or whether the program was recorded by a different guest. This  
20 may allow different treatment in terms of charges to the guest depending upon who recorded the program.

Fourth, the guest can use the interactive program guide to select for recording a program which is not yet being aired. When the guest highlights and selects a program schedule to happen in the future, UHC 20 causes interactive  
25 program guide 200 to acknowledge that the guest is requesting that the program be recorded for later viewing. If there is a charge for the recording of programs (as opposed to the viewing of programs), interactive program guide 200 will indicate that there is a charge and will require a further action, (such as the pressing of an order key) to continue. When the guest has confirmed the desire to record the

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To conserve storage space and to eliminate the storage and subsequent listing of the same program requested for recording by multiple guests, UHC 20 preferably receives and stores all requests for recording programs, creates a consolidated recording schedule, and then associates each guest who requested a particular program with the digital file for that program. This avoids having to record the same program multiple times, once each for every different guest who requests that the program be recorded.

Other implementations of the present inventions are possible. For example, in other embodiments the encoder array may be combined with its own separate digital content server, so that recording and play back of television programs is separate from the digital content server which provides movies and other pre-recorded material.

Similarly, the encoder array can be incorporated into the digital content server, so that no separate interconnection between the two units is required. The interactive program guide can take a number of different forms. As

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